



Standard Specification for Heavy Duty Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings¹

This standard is issued under the fixed designation C 1540; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification covers the evaluating of the performance of heavy duty shielded couplings to join hubless cast iron soil pipe and fittings.

1.2 Couplings covered by this standard shall have minimum dimensions as found in Table 1 and Fig. 1 of this standard.

1.3 The values stated in inch-pound units are to be regarded as the standard. The SI units given in parentheses are for information only.

1.4 The committee with jurisdiction over this standard is aware of comparable standards published by other organizations, namely Cast Iron Soil Pipe Institute specification CISPI 310 and Factory Mutual Research standard FM 1680.

1.5 The following precautionary caveat pertains only to the test method portion, Section 7, of this specification. *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

A 240 Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip²

A 493 Specification for Stainless Wire and Wire Rods for Cold Heating and Cold Forging²

A 888 Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary, Storm and Drain, Waste, and Vent Piping Applications²

C 564 Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings²

C 717 Terminology of Building Seals and Sealants²

2.2 CISPI Standards:

CISPI-301 Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications

CISPI-310 Specification for coupling for use in Connection

¹ This specification is under the jurisdiction of ASTM Committee C24 on Building Seals and Sealants and is the direct responsibility of Subcommittee C24.75 on Gaskets and Couplings for Plumbing and Sewer Piping.

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² Annual Book of ASTM Standards, Vol

TABLE 1

Nominal Pipe Size	Coupling Width
1½ to 4 in. (38 to 100 mm)	3 in. (76 mm) Minimum Width
5 to 10 in. (127 to 254 mm)	4 in. (100 mm) Minimum Width
12 to 15 in. (305 to 381 mm)	5½ in. (140 mm) Minimum Width

with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications
FM 1680 Approval Standard Couplings used in Hubless Cast Iron Systems for Drain, Waste or Vent Systems above or below ground Industrial, Commercial, and Residential

3. Terminology

3.1 Definitions:

3.1.1 Definitions of the following terms used in this specification are found in Terminology C 717.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *center stop, n*—an integral part of the gasket centered on the axial length of the gasket intended to limit the insertion depth of the pipe to be coupled.

3.2.2 *clamp assembly, n*—that portion of the coupling excluding the gasket.

3.2.3 *coupling, n*—the complete assembly.

3.2.4 *fitting, n*—parts of a pipeline other than straight pipes, valves, or couplings.

3.2.5 *gasket, n*—the elastomeric portion of the coupling.

3.2.6 *heavy duty coupling, n*—a shielded coupling that has dimensions not less than those detailed in Table 1 and Fig. 1.

3.2.7 *joint, n*—the point of assembly consisting of the coupling and the joined pipes or fittings, or both.

3.2.8 *shield, n*—an external metallic protective device designed to protect the sealing gasket from external elements that could cause failure of the sealing assembly.

4. Materials and Manufacture

4.1 Physical properties of gaskets shall comply with Specification C 564 using the applicable durometer hardness requirement of the column of Table 2 of that document as specified by the manufacturer.

4.2 Clamp assembly screws or bolts shall not have screw-driver slots.

4.3 All stainless steel shall meet the physical requirements of Specification A 240.

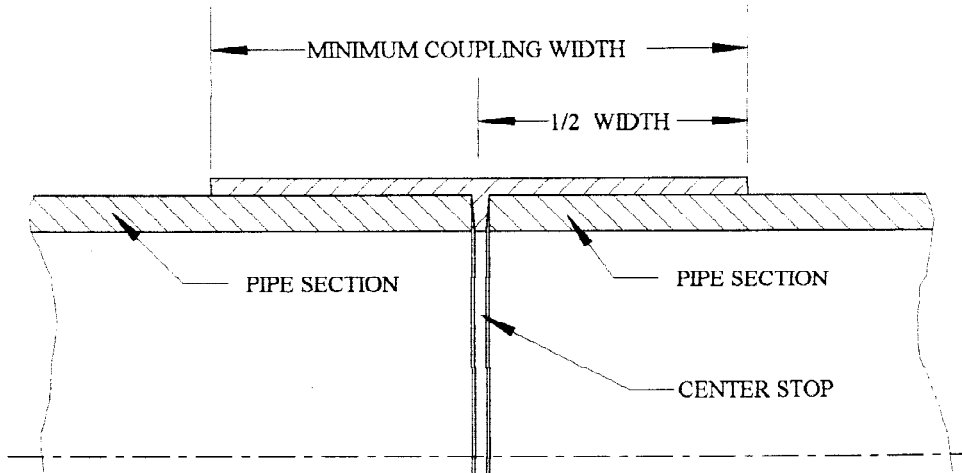


FIG. 1 Typical Center Stop Detail

TABLE 2 Dimensions and Tolerances for Hubless Pipe and Fittings

Size, in. (mm)	Outside Diameter, in. (mm)
1½ (38)	1.90 ± 0.06 (48.26 ± 1.52)
2 (51)	2.35 ± 0.09 (59.69 ± 2.29)
3 (76)	3.35 ± 0.09 (85.09 ± 2.29)
4 (102)	4.38+0.09-0.05 (111.25+2.29/-1.27)
5 (127)	5.30+0.09-0.05 (134.63+2.29/-1.27)
6 (152)	6.30+0.09-0.05 (160.02+2.29/-1.27)
8 (203)	8.38+0.13-0.09 (212.85+3.30/-2.29)
10 (254)	10.56 ± 0.09 (268.22 ± 2.29)
12 (305)	12.50 ± 0.09 (317.5 ± 2.29)
15 (381)	15.83 ± 0.09 (402.08 ± 2.29)

5. Elastomeric Gasket Requirements

5.1 The elastomeric gasket shall consist of one piece polychloroprene construction conforming to the physical requirements of Specification C 564.

5.1.1 The elastomeric gasket shall have an inside center stop that does not create an enlargement chamber or recess with a ledge, shoulder, or reduction of pipe area or offer an obstruction to flow.

5.1.2 The elastomeric gasket shall be free of defects that affect the use and serviceability.

6. Clamp Assembly Requirements

6.1 The clamp assembly shall be made of material conform-

ing to the requirements as outlined in Sections 4 and 6.

6.1.1 All metallic parts shall be of 300 series stainless steel and shall conform to the requirements of Specification A 240. All metallic parts made from round stock shall be of 300 series stainless steel and shall conform to the requirements of Specification A 493 (excluding copper bearing alloys).

6.1.2 Clamp assemblies shall be tested to withstand no less than 125 % of the manufacturers stated installation torque without visible signs of failure. The clamp assembly shall be tested over a steel mandrel of the appropriate diameter and torqued as required.

7. Couplings Requirements and Test Methods

7.1 Assemble each coupling to be tested according to the manufacturer's instructions between two sections of randomly selected hubless cast iron soil pipe meeting the requirements of CISPI 301 or Specification A 888 and conduct deflection and shear tests. In addition, unrestrained hydrostatic tests shall be performed as detailed in 7.2.

7.1.1 Deflection Test:

7.1.1.1 A test apparatus such as the one shown in Fig. 2 is suggested. Other testing apparatus that provide restraint to the assembly shall also be permitted. Close the outboard ends of the pipe with test plugs.

7.1.1.2 Fill the assembly with water, expel all air, and hydrostatically pressurize to 8.6 psi (59.3 kPa) for the duration



FIG. 2 Deflection Test

of the test. One pipe shall be rigidly supported and while the assembly is under pressure, raise the opposite end of the other pipe 1 in. (25 mm) per lineal foot of pipe. Maintain the pressure for 15 min. Any leakage shall mean failure.

7.1.2 Shear Test:

7.1.2.1 Support two joined lengths of randomly selected hubless cast iron soil pipe on blocks, a minimum of 1½ in. (38.1 mm) high, at three locations. One length shall be a minimum of 24 in. (609.6 mm) in length, supported on blocks, one near the uncoupled end, and the other immediately adjacent to the couplings. Firmly restrain this length in position as shown in Fig. 3. The other coupled length shall be a minimum of 5 ft (1.52 m) in length and supported by a single block 6 in. (152.4 mm) from the end of the pipe.

7.1.2.2 Fill the assembly with water and expel all air. Apply a load of 50 lb per in. (22.7 kg) of nominal diameter at a point 6 in. (152.4 mm) from the edge of the coupling upon a 12 in. (304.8 mm) length of 3 by 3 in. (76.2 by 76.2 mm) angle iron or load distribution pad located on the top of the pipe immediately adjacent to the coupling of the pipe having one support only. Under this loading there shall be no visible leakage or displacement of more than ⅜ in. (9.53 mm) from true alignment adjacent to the coupling, when an internal pressure equivalent to a 20 ft (6.10 m) head of water 8.6 psi (59.3 kPa) is applied. Maintain the load and internal pressure for 15 min.

7.2 Unrestrained Hydrostatic Joint Test:

7.2.1 Assemble each coupling to be tested according to the manufacturer's instruction between two sections of machined steel pipe and conduct the unrestrained hydrostatic joint test.

7.2.2 The assembly shall consist of a maximum outside diameter pipe connected to a minimum outside diameter pipe with diameters as referenced in Table 2 and lengths as shown in Fig. 4. Machine the plain ends of the pipe to be used for the

thrust test to the correct diameters. Plain ends shall have 0.015 in. (0.38 mm) deep grooves machined circumferentially around them at ⅛ in. (3.18 mm) intervals down the pipe section for a distance equal to that covered by the elastomeric sleeve of the coupling being tested. The tool used to machine the grooves shall have a 60° included angle and cut into the pipe from a perpendicular position. The surface between the grooves shall be a lathe turned surface of 125 RMS.

7.2.3 The plain ends of the pipe for the thrust test shall be uncoated and cleaned with acetone and thoroughly dried before each assembly.

7.2.4 Test Method:

7.2.4.1 Support the pipe assemblies in a manner that does not restrain joint movement as shown in Fig. 4.

7.2.4.2 Fill the pipe assembly (as required in 7.2) with water, expelling all air. Increase the hydrostatic pressure at a rate of 1 psi (6.9 kPa) every 30 s until the specified test pressure is reached. The specified test pressure shall be 30 psi (206.8 kPa) for 1½ in. (38.1 mm) through 5 in. (127 mm), 27 psi (186 kPa) for 6 in. (152.4 mm), 15 psi (103.4 kPa) for 8 in. (203.2 mm), 9 psi (62 kPa) for 10 in. (254 mm), and 6 psi (31.3 kPa) for 12 and 15 in. pipe. When the specified test pressure is reached, hold it for 15 min. Any leakage or axial joint movement of more than 0.150 in. (3.81 mm) shall mean failure.

8. Markings and Identification

8.1 Permanently mark each clamp assembly with the manufacturer's name or U.S. registered trademark, country of origin, all stainless and the pipe size for which it is designed. Marking shall be visible after installation.

8.2 Gasket markings shall conform to Specification C 564.

8.3 The product shall also have any other markings required by law and shall have the option to include this designation (Specification C 1540).

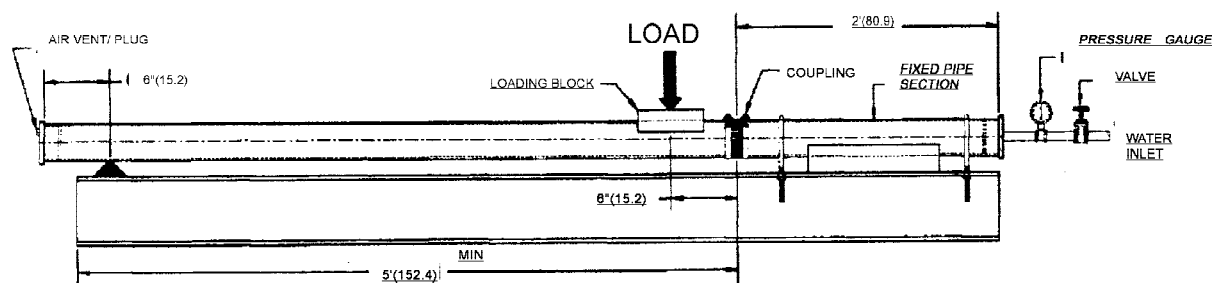


FIG. 3 Shear Test

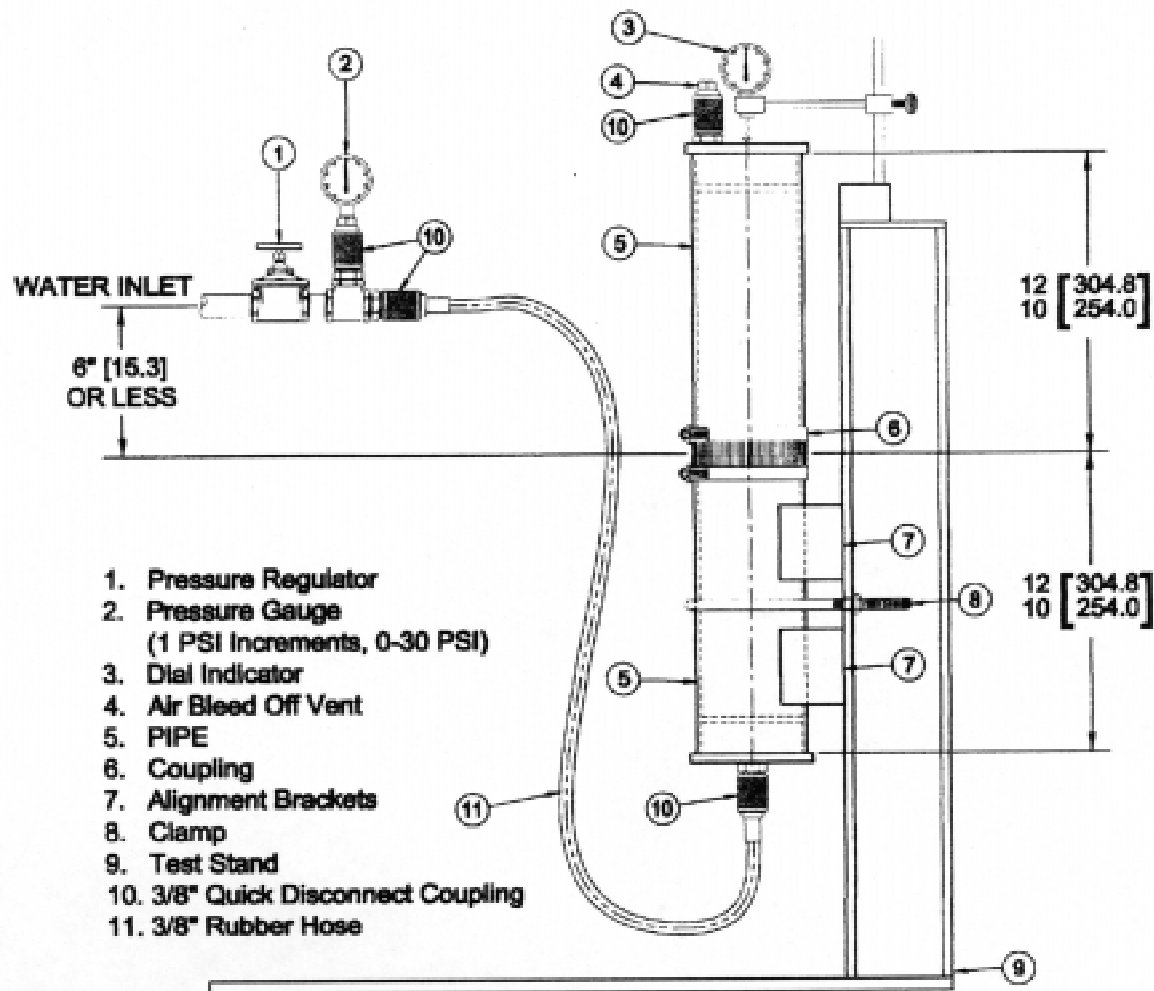


FIG. 4 Unrestrained Hydrostatic Joint Testing Apparatus

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